

MILLIPEDES FROM AUSTRALIA, 5: AUSTRALIOSOMATINI FROM SOUTH AUSTRALIA, WITH A NOTE ON THE STATUS OF *POLYDESMUS INNOTATUS* KARSCH, AND FIRST RECORD OF A SECOND MEDITERRANEAN JULID IN AUSTRALIA (DIPLOPODA: POLYDESMIDA, PARADOXOSOMATIDAE & JULIDA, JULIDAE)

by

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ABSTRACT

JEEKEL, C. A. W. 1985. Millipedes from Australia, 5: Australiosomatini from South Australia, with a note on the status of *Polydesmus innotatus* Karsch and first record of a second Mediterranean julid in Australia (Diplopoda: Polydesmida, Paradoxosomatidae & Julida, Julidae). *Rec. S. Aust. Mus.* 19(3): 19-37.

Two new species of the genus *Heterocladosoma* Jeekel, *H. zebratus* and *H. galaxias*, and one of the genus *Somethus* Chamberlin, *S. grossi*, are described. *Australiosoma castaneum* Attems is redescribed and made the type-species of a new genus *Oncocladosoma*, which is probably related to *Somethus*, *Dicladosomella* Jeekel and *Phyllocladosoma* Jeekel. A new subspecies, *O. castaneum ingens*, and two new species, *O. contigerum* and *O. clavigerum*, are added to the new genus. The holotype of *Polydesmus innotatus* Karsch, a subadult female, has been re-examined; it may be referable to a genus close to *Otoplacosoma* Verhoeff (tribe Antichiropodini). A list of the known South Australian Paradoxosomatidae is given, and some distributional patterns are briefly discussed. *Brachyiulus lusitanus* Verhoeff, a west Mediterranean julid, is recorded from a number of South Australian localities.

INTRODUCTION

This is the second of two papers treating the Paradoxosomatidae of South Australia. The first paper dealt with the Antichiropodini (Jeekel 1982a) and the present contribution treats the Australiosomatini of the State. As pointed out already, our knowledge of the millipedes of South Australia is extremely scanty. In the family Paradoxosomatidae only two species had been described: *Polydesmus (Strongylosoma) innotatus* Karsch, 1881, an unrecognizable species of uncertain taxonomic status, and *Australiosoma castaneum* Attems, 1944, a reasonably well characterized but as yet not correctly classified species (cf. Jeekel 1968: 26).

The material reported upon was received on loan from the South Australian Museum, Adelaide. It had been collected mostly in the surroundings of Adelaide, and only few samples from elsewhere were available. Nevertheless, it gives a fair first impression of the

composition of the fauna, and indicates that South Australia has a relatively rich representation of Paradoxosomatidae (together with the suborder Cambalidea of the order Spirostreptida the family appears to be the dominant millipede group) with still many new species to be expected.

The type-specimen of *Polydesmus innotatus* Karsch has been re-examined, but it is a subadult female, which cannot be associated with any of the other South Australian paradoxosomatids at hand. Neither can it be referred with certainty to either of the two relevant Australian paradoxosomatid tribes.

It has been pointed out earlier (Jeekel 1981: 20) that records of millipedes introduced into Australia from elsewhere are few. The material in the South Australian Museum contains, besides some specimens of *Ommatoiulus moreleti* (Lucas), a species now known to have become widespread in a large part of South Australia, also a number of samples of *Brachyiulus lusitanus* Verhoeff, a Mediterranean julid known to have synanthropic tendencies, but as yet recorded only a few times from outside the palearctic region.

The bulk of the material treated, including the types of the new species, is preserved in the South Australian Museum, some paratypes and voucher specimens have been retained by the author for the Zoological Museum at Amsterdam.

SOUTH AUSTRALIAN AUSTRALIOSOMATINI

Heterocladosoma Jeekel

Heterocladosoma Jeekel, 1968: 144.

Type-species: *Eustrongylosoma bifalcatum* Silvestri, 1898.

Remarks

This genus was proposed for three species occurring in the coastal region of Queensland. The quite unexpected discovery of two new species in South Australia extends the range of the genus considerably and establishes an important faunistic link between the fauna of South Australia and that of the Australian east coast.

Heterocladosoma is well characterized by two tibiotarsal branches arising from the base of the acropodite of the gonopod, one narrow lanceolate, the other more voluminous, broadly laminate and apically more or less recurved. The femoral process is coalesced with the solenomerite over most of its length, its free part arising from the distal part of the channel-bearing branch of the gonopod as in *Somethus* Chamberlin. But contrary to *Somethus*, which has only one tibiotarsal branch, the spermal channel does not make a loop, but runs straight towards the apex of the solenomerite.

Heterocladosoma zebbratum n. sp.

Material

Coralbignie to Buckleboo, South Australia, 15-16.III.1950, leg. G. F. Gross, ♂ holotype, 3 ♀ paratypes.

North of Kokotha, South Australia, 11.VI.1956, burnt out of spinifex, leg. G. F. Gross, 1 ♂ paratype.

Nonning, Gawler Ranges, South Australia, 17. VI. 1956, burnt out of spinifex (*Triodia* sp.), leg. G. F. Gross, 1 ♂ paratype.

Description

Colour: Probably somewhat faded. Head with clypeus, frons and anterior part of vertex brown; remainder, including lateral sclerites brownish yellow. Antennae light brown, infusate towards apex of 6th antennomere; 7th antennomere black, its tip whitish. Intersegmental membranes of antennae brownish yellow. Collum with a broad zone along anterior and lateral margins brown, remaining part brownish yellow. Subsequent somites with a rather narrow zone of the prosomites adjacent to waist, the waist itself, and the part of metatergites adjacent to waist, about halfway towards the transverse furrow, brown, fading below the level of paranota to brownish yellow. Remaining parts of pro- and metasomites brownish yellow. Venter and sternites brownish yellow. Legs brown, with pale intersegmental membranes and a pale tarsal tip. Anal somite dorsally brownish yellow, sides brown; margins yellowish. Paraprocts brown, with brownish yellow margins. Hypoproct yellowish.

Width: ♂: 2.5-3.5 mm, ♀: 3.2-3.5 mm.

Head and antennae: Labrum widely and rather weakly emarginate. Clypeus rather strongly impressed towards labrum and with an impression on each side below antennal sockets. Lateral border widely convex, weakly emarginate near labrum. Surface uneven due to the presence of setiferous pits. Pubescence moderate, setae of moderate length. Lateral parts of head almost hairless. Frons not demarcated from clypeus or vertex, sparsely setiferous. Antennal sockets separated by 1.5 times diameter of a socket or by 0.7 times the length of 2nd antennomere. Postantennal groove rather deep and wide, the wall in front moderately prominent. Postantennal bean-shaped area indistinct, weakly

demarcated and not inflated. Vertex longitudinally widely convex, more strongly so near collum; transversely faintly concave, and laterally rather strongly convex, but without inflated lateral edges. Vertical sulcus moderately impressed, running downward to upper level of sockets. Vertex hairless. Antennae rather long and slender, weakly clavate, with 5th and 6th antennomeres thickest. Antennomeres subcylindrical, but 5th and 6th a little more obconical; 6th antennomere not inflated. Pubescence moderate in proximal antennomeres, becoming rather dense in the distal ones. Relative length of antennomeres 2 to 6: 0.95, 1.00, 0.95, 0.95, 0.90.

Collum: About as wide as head, subtrapezoidal in dorsal outline. Anterior border straight in middle, widely rounded more laterally and straight again towards lateral sides. Posterior border widely and weakly concave, laterally rather weakly convex. Lateral sides almost evenly and rather narrowly rounded. Marginal rim laterally a little incrassate, not brimlike. Premarginal furrow distinct, vanishing towards middle of anterior border. Surface smooth, hairless, transversely widely and evenly convex in middle to become somewhat more strongly convex laterally; longitudinally widely convex, a little more strongly so near anterior border.

Somites: Rather weakly constricted. Prosomites dulled by a fine cellular structure. Waist narrow, rather sharply demarcated from pro- and metasomite, dorsally distinctly beaded down to level of paranota, weakly striolate along sides. Metatergites smooth, shiny, hairless. Transverse furrow present from 5th to 17th somite, weakly indicated on 4th and 18th somites. Furrow rather well impressed, with a vague sculpture, disappearing laterally at a distance from dorsal furrow of paranota about equal to dorsoventral diameter of a poriferous paranotum. Sides smooth in general, but up to 4th somite somewhat granulose. Pleural keels up to 3rd somite represented by rather distinct curved crenulate ridges, concavity upwards, without posterior lappet. Pleural keels in 4th somite vestigial, in 5th absent. Sixth somite with a weak posterior swelling and 7th with a low conical swelling near posterior margin of somite.

Paranota: 2nd somite a little wider than collum. In dorsal aspect anterior border rounded and slightly shouldered at base; latero-anterior edge narrowly rounded, without distinct lateral tooth. Lateral border widely and almost evenly rounded. Latero-posterior edge subangular, narrowly rounded, a little produced caudad and projecting weakly behind margin of somite. Posterior margin very short and a little concave. In lateral aspect upper side straight, sloping a little in anterior direction. Marginal rim rather thick, a little callous; upper furrow distinct, also along anterior and posterior margins. Third somite a little wider than 2nd and as wide as 4th. Paranota of 3rd somite in dorsal aspect widely and evenly rounded, a little more narrowly rounded anteriorly. Latero-posterior edge angular and

a little produced caudad, but not projecting behind margin of somite. Posterior border short, straight. In lateral aspect upper margin straight, curving abruptly dorsad anteriorly. Dorso-ventral width not much larger than that of paranota of 2nd somite; ventral demarcation by a distinct impression, reaching forward to about three-fifths length of metasomite. Paranota of 4th somite rather similar to 3rd. In dorsal aspect more widely curved than in 3rd somite, with posterior edge subangular, not produced caudad, and posterior border straight. In lateral aspect upper margin curved dorsad more widely. Dorso-ventral width as in 3rd somite, but ventral demarcation reaching cephalad to about halfway. Paranota of 5th somite rather weakly developed and rather weakly prominent. Margin in dorsal aspect widely convex. Posterior edge subangular in poreless somites, narrowly rounded in poriferous somites. In posterior somites posterior edges become minutely angular and produced a little caudad from 14th somite onwards, projecting only a little behind caudal margin of somite in 17th and 18th somites. In lateral aspect dorsal demarcation of paranota weakly concave anteriorly, weakly convex posteriorly in poriferous somites, about straight in poreless somites. Dorsal furrow anteriorly rather abruptly curving upwards, but not reaching waist. Paranota dorsoventrally not wide, rather narrow, especially in poreless somites. Ventral demarcation by a depression reaching cephalad to about halfway or two-fifths length of metasomite. Posterior edges in lateral aspect acutely angular, especially in poreless somites. In poreless somites ventral demarcation a little concave.

Sternites and legs: Sternites of middle somites longer than wide (ratio 1.3:1.0). Cross impressions well developed; longitudinal impression rather wide; transverse impression also rather wide, but narrow between coxae. No sternal cones. Pubescence rather dense, especially near bases of coxae; hairs of moderate length. Sternite of 4th somite rather broad, rather densely setiferous, and transversely rather widely concave. Sternite of 5th somite with a broad process arising between and slightly in front of anterior coxae; at base the process is a little wider than distance between coxae. Process short, projecting downward, widely rounded. Anterior side a little concave with dense brush of short setae. Posterior side faintly convex with some long hairs. Transverse impression deep. Posterior part of sternite excavate, but not down to level of metasomal ring; not raised at base of coxae. A group of long setae in the middle. Sternite of 6th somite deeply excavate; posteriorly level with metasomal ring but anteriorly a little raised above level as in posterior part of sternite of 5th somite. Coxal bases not raised, but coxae of legs distinctly elongate. Transverse impression wide and shallow. Four areas with long setae arranged in a square. Sternite of 7th somite with a low and rather narrow, finely granular ridge laterocephalad of gonopod aperture. Sternite of 8th somite excavate, particularly in anterior half, and raised only a little above ventral level

of metasomal ring. Transverse impression weakly developed. Legs rather long and slender, prefemora rather convex dorsally. Pubescence on ventral side rather dense in all podomeres. Hairs moderately long. Tarsi pubescent on all sides. Femora almost straight. Tibial and tarsal scopulae present on anterior legs but soon thinning out and absent from legs of 7th somite onwards. First leg strongly incrassate. Coxa of 2nd leg with a short medial rounded cone. Relative length of podomeres 2 to 6 in middle somites: 0.65, 1.00, 0.60, 0.55, 0.75.

Anal somite: Dorsal profile straight or faintly convex. Sides of epiproct concavely converging, before apex a slight indication of an abrupt stepwise narrowing, quite near apex. Apex of epiproct with lateral edges narrowly rounded and posterior margin weakly concave. Epiproct broad at base, distally still rather broad. Dorsoventral width moderate, length moderate. Setae not on tubercles. Paraprocts with narrow, moderately high rims. Setae not on tubercles. Hypoproct large triangular, parabolically rounded with sides convex and apex more narrowly rounded. Setae not on tubercles.

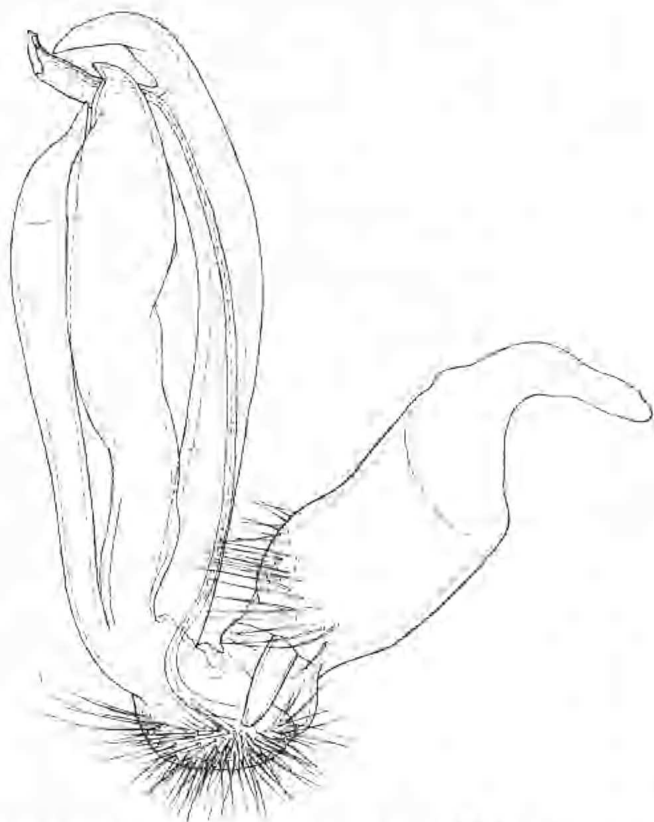


FIG. 1. *Heterocladosoma zebraum* n. sp., holotype ♂, right gonopod, medial aspect.

Gonopods: (Fig. 1) Coxa somewhat elongate, rather stout at base, but narrowing distad. Setiferous area rather large. Prefemur short, ovoid; its distal demarcation transverse on axis of acropodite. Tibiotarsal branches both well developed; caudal one lanceolate, widening a little distad; anterior one stouter, more irregular in shape, and ending in an acuminate somewhat uncate apex. Solenomerite well developed,

with permal channel running along medial side, widely curved and apically narrowing to solenomerite proper, which curves a little mesad. Femoral process arising quite near apex of solenomerite, curving caudad, about as long as solenomerite proper, apex acuminate.

Female: Sternites as long as wide. Pubescence of legs and sterna less conspicuous than in male. Legs shorter, pre femora not incrassate. Relative length of podomeres 2 to 6 in middle somites: 0.80, 1.00, 0.50, 0.50, 0.85. Head with vertex transversely more evenly convex, not particularly flattened in middle and without lateral swellings. Collum with anterior border much more evenly convex and only a little more strongly rounded laterally. Pleural keels of 2nd somite produced into a long process; of 3rd somite in a long posterior cone; in 4th somite only a minor cone near caudal margin. Coxa of 2nd leg with a dagger-like process arising from ecto-caudal side of apex, pointing latero-ventrad. Epigynal structure consisting of two paramedian wide emarginations separated medially by a low conical process pointing cephalad.

Remarks

The three previously described species of *Heterocladosoma*, viz. *H. bifalcatum* (Silvestri, 1898), *H. transversetaeniatum* (L. Koch, 1867), and *H. hamuligerum* (Verhoeff, 1924), are all from the coastal region of Queensland between Cairns and Brisbane. Compared to *H. zebraatum* and *H. galaxias* these three species are different in that the largest tibiotarsal branch projects a little distad of the seminiferous branch. *H. hamuligerum* is distinct in having the seminiferous branch apically divided into three processes, a solenomerite and two, or possibly one, deeply split femoral branches. In *H. transversetaeniatum* and *H. bifalcatum* the bifurcation of the seminiferous branch into solenomerite and femoral process is situated closer to the base of the branch, resulting in a relatively greater length of the two distal processes. *H. transversetaeniatum* is particularly distinct in its voluminous gonopod telopodite and in the apex of the larger tibiotarsal branch which is strongly recurved forming an elongate spinelike production. As yet it is not clear to which of the three Queensland species *H. zebraatum* and *H. galaxias* are most closely related, but on account of the total configuration of the gonopods these new species seem to approach *H. bifalcatum* more than the others.

Heterocladosoma galaxias n. sp.

Material

Gammon Plateau, South Australia, 19.IX.1956, leg. G. F. Gross, ♂ holotype.

Description

Colour: Head dark brown, with labral area, an area around antennal sockets and sutures of lateral sclerites

yellowish brown. Antennae dark brown, with 6th and 7th antennomeres darkest; intersegmental membranes yellowish, tip whitish. Collum blackish brown, with a pair of semilunate yellowish white spots at caudal margin, almost touching medially and continued laterally in a yellowish streak along caudal margin, disappearing near lateral rounding. Somites blackish brown, ventrally paler. Sternites and legs rather dark brown. Dorsum marked by two series of paramedian oval yellowish white spots, occupying the metatergites from halfway between waist and transverse furrow, and prosomites of the next somite to about halfway to its waist. Lateral sides a shade paler brown in their posterior third. Anal somite dark, but ventral side including hypoproct paler brownish; epiproct entirely yellowish white.

Width: 3.3 mm.

Head and antennae: As in the preceding species, but differing in antennal sockets being a little closer to each other, and separated by 1.35 times diameter of a socket, or by 0.6 times length of 2nd antennomere. Antennae with distal antennomeres a little shorter; relative length of antennomeres 2 to 6: 0.95, 1.00, 0.95, 0.85, 0.75.

Collum: Differing only in being a little wider than head.

Somites: Waist rather narrow, distinctly demarcated from both pro- and metasomites, dorsally not beaded, but faintly longitudinally striate down to level of stigmata. Pleural keels in 4th somite weakly developed.

Paranota: Posterior edge of paranota of 2nd somite, not caudally produced, posterior border obsolete. In lateral aspect the upper margin curves a little upward caudad. Posterior edge of paranota of 3rd somite produced a little and projecting slightly caudad of margin. Posterior edges of paranota of 5th and subsequent somites narrowly rounded in dorsal aspect, becoming subangular in 14th somite only, not produced caudad. Ventral demarcation of paranota reaching cephalad to about three fifths of length of metasomite. Posterior edges in lateral aspect rather narrowly truncate in poreless somites, more widely and more obliquely truncate in poriferous somites.

Sternites and legs: Similar to those of the preceding species. Sternal cones are weakly indicated in sternites of middle part of body. Sternite of 5th somite with process directed downward and a little cephalad, projecting scarcely in front of the sternite. Process rather short, its apex quite widely triangular, medially rounded. In lateral aspect posterior side of process straight, with a transverse concavity at its base. Legs rather long and moderately stout. Relative length of podomeres 2 to 6 in middle somites: 0.50, 1.00, 0.55, 0.55, 0.70.

Anal somite: Epiproct almost parabolically rounded; apex rather narrowly rounded, medially straight and not emarginate.

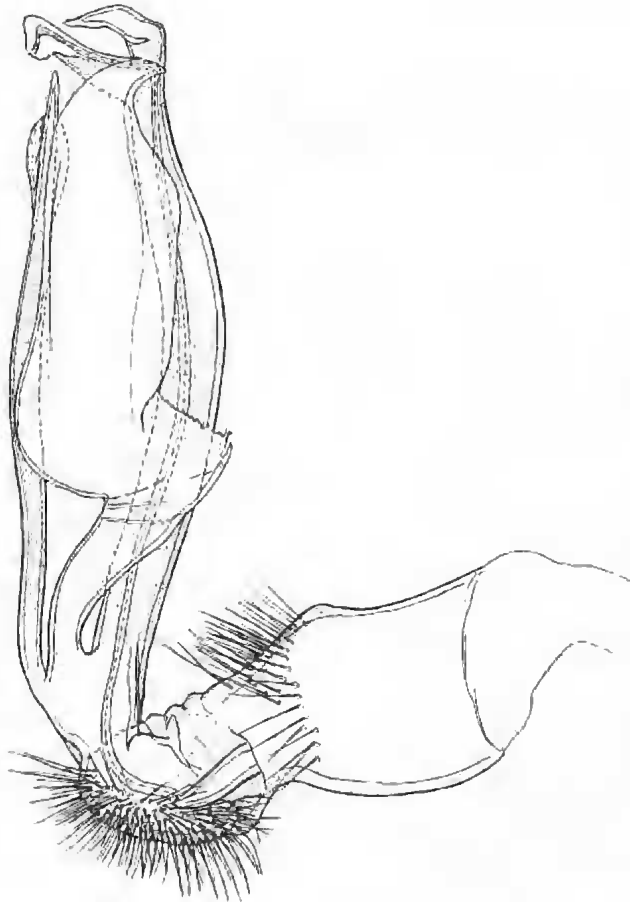


FIG. 2. *Heterocladosoma galaxius* n. sp., holotype ♂, right gonopod, medial aspect.

Gonopods: (Fig. 2) Largely similar to those of the preceding species, but anterior tibiotarsal branch quite different: narrow at base, gradually widening distad, sharply crooked, and curving rather abruptly distad again; terminal part rather voluminous and tapering towards apex and somewhat uncinate. Posterior tibiotarsal process distally widening, then rather abruptly narrowing and ending in a narrow spinelike process (strongly reminiscent of a similar structure in *Streptocladosoma dissimile* Jeckel (1980: 8, Figs 8-9.)

Female: Unknown.

Remarks

Although this species is obviously closely related to *H. zebratum*, it is easily distinguished by its very distinctive colour pattern, by differences in the structure of the gonopods, and some other features like the different sculpture of the waist, the slightly stronger development of the pleural keels, the less prominent paranota, and the presence of weak sternal cones.

Somethus Chamberlin

Somethus Chamberlin, 1920: 651; Jeckel, 1968: 27; Jeckel, 1979: 651.

Type-species: *Somethus fuscipes* Chamberlin, 1920.

Remarks

This genus was erected by Chamberlin for the reception of a single species from an unknown Australian locality. Unfortunately, the original description was not accompanied by a drawing of the gonopod of the type-species. On that account the placement in the tribe Australiosomatini was somewhat arbitrary (Jeckel 1968). A re-examination of the type material (Jeckel 1979) confirmed the placement. However, with regard to the gonopod structure, doubt still exists on the true identity of the species.

The discovery of some species of the genus in northern Tasmania and Victoria, to be published elsewhere, and the new species described hereunder has proved that *Somethus* is a well-defined genus characterized in particular by having a single tibiotarsal branch, arising from near the base of the acropodite of the gonopod, a small femoral process emanating from the channel-bearing branch of the gonopod more or less near its apex, and a short solenomerite proper, having a triangular additional process, in which the spermal channel makes a loop before running towards the apex of the solenomerite.

The record of *Somethus grossi* n. sp. from South Australia extends the distribution westward into the moister parts of that State. It seems likely that the type-species may be found sooner or later somewhere in southeastern Australia also.

Somethus appears to be closely related on the one hand to *Phyllocladosoma* Jeckel, 1968, and *Dicladosomella* Jeckel, 1982, in which the femoral process is completely lost and the tibiotarsal branch more broadly expanded, and on the other hand to *Oncocladosoma* n. gen., in which the femoral process is vestigial or absent and the tibiotarsus is also more voluminous and more or less clubshaped. The four mentioned genera are furthermore each characterised by a particular size and curvature of the solenomerite proper.

Somethus grossi n. sp.

Material

Rankin Creek, near Melrose, South Australia, 13.VI.1954, leg. G. F. Gross (E.S.I. 1355), ♂ holotype, 1 ♀ paratype.

Same locality, date and collector (E.S.I. 1355), 3 ♂ paratypes.

Description

Colour: Head brown, with labral area, an area around the antennal sockets, and lateral sclerites of head yellowish. Antennae yellowish to brown, with 6th and basal part of 7th antennomere darkest. Collum brown, with traces of a rather narrow, medially widest, transverse band along posterior margin. Somites also brownish, with most of area behind the transverse furrow, including posterior half of paranota, yellowish.

Venter, sternites and legs yellowish. Anal somite brown, but most of epiproct, and margins of paraprocts, and hypoproct yellowish. The material appears to have lost much of its original colour and the brown colour may have been blackish brown in living specimens.

Width: ♂: 3.2-3.4 mm, ♀: 3.7 mm.

Head and antennae: Labral emargination of moderate width and depth. Clypeus very strongly impressed towards the labrum, the impression crescentic in shape, and surface above it a little inflated. Clypeus with setiferous pits, moderately densely pubescent; on each side below antennal sockets a rather weak impression. Setae rather short. Lateral border of clypeus widely and weakly convex, a notch near the labrum. Lateral sclerites of head hairless. Frons not demarcated from clypeus or vertex, smooth, hairless. Antennal sockets separated by 1.6 times diameter of a socket or by 0.7 times length of the 2nd antennomere. Postantennal groove rather deep and moderately wide, wall in front rather prominent. Bean-shaped area at posterior margin of antennal sockets rather distinctly demarcated, slightly inflated. Vertex almost evenly convex longitudinally, slightly more convex near collum; almost flat or even a little concave transversely, lateral edges rounded and somewhat inflated. Vertex smooth, shiny, hairless; vertexal sulcus rather deeply impressed, not reaching upper level of the antennal sockets. Antennae rather long, slender, hardly clavate. Antennomeres subcylindrical; 6th slightly more obconical but not inflated. Pubescence moderate in proximal antennomeres becoming dense in distal ones. Relative length of antennomeres 2 to 6: 1.00, 0.95, 0.90, 0.80, 0.70.

Collum: A little wider than head, subtrapezoidal in dorsal outline. Anterior border straight or very faintly concave, widely rounded more laterally and straight again towards lateral sides. Posterior border widely emarginate in middle, widely rounded towards lateral sides. Lateral border moderately widely and symmetrically rounded. Surface transversely weakly convex, laterally more strongly so, and even slightly incurved at sides. Longitudinally surface evenly widely convex. Lateral margin with a narrow and low rim; premarginal furrow distinct, disappearing at level of the lateral edge of the vertex. Surface smooth, shiny and hairless.

Somites: Rather weakly constricted. Prosomites dulled by a fine cellular structure and with fine striae. Waist narrow, rather distinctly demarcated from pro- and metasomites, dorsally finely but distinctly longitudinally ribbed down to the level of the paranota, faintly striolate below that level. Metatergites smooth or with some fine wrinkles, shiny and hairless. Transverse furrow present on 5th to 16th somites, vaguely also on 17th somite. Furrow moderately impressed and with some vague sculpturing, running laterad to a distance from upper margin of paranota equal to the dorso-ventral diameter

of a poriferous paranotum. Sides smooth, or somewhat irregularly and finely wrinkled, shiny. Anterior somites up to 4th with sides a little subgranularly uneven. No pleural keels.

Paranota: 2nd somite a little wider than the collum. Lateral border in dorsal outline straight anteriorly and a little diverging in caudal direction, and widely convex posteriorly. Latero-posterior edge narrowly rounded, incurved so as to be slightly produced and projecting a little behind margin of somite. Posterior border almost obsolete. Anterior border moderately widely rounded, latero-anterior edge narrowly rounded, with a small, almost obsolete lateral tooth. In lateral aspect upper margin widely and weakly concave dorsally, situated on a low level, and therefore scarcely visible from above; upper margin slightly sloping in anterior direction. Paranotum dorsoventrally rather narrow. The upper furrow distinct along all margins including the anterior and posterior. Third somite a little narrower than 2nd and a little wider than 4th. Paranota in dorsal aspect evenly rounded, anteriorly and posteriorly more narrowly. Posterior edges particularly in 3rd somite angular, in 3rd somite slightly produced caudad, but not projecting behind margin of the somite; in 4th narrowly rounded and not produced. Posterior border in 3rd somite very short, almost obsolete, in 4th obsolete. In lateral aspect paranota of 3rd and 4th somites with a widely concave upper margin, rather abruptly curving dorsad anteriorly, posteriorly curving upwards and shortly paralleling posterior margin of somite. Dorso-ventral width rather narrow to moderate. Lower demarcation formed by a depression reaching cephalad to about two-fifths of length of metasomite. Posterior edges of paranota in lateral aspect acuminate. Paranota of 5th and subsequent somites rather weakly prominent. In dorsal aspect lateral margin of poriferous paranota widely rounded, with a faint emargination from pore area to caudal edge. Lateral rounding of poreless paranota a little wider. Posterior edge of paranota narrowly rounded, but in poreless somites and in poriferous somites of caudal half of body posterior edges become more angular and quite weakly produced caudad, though not projecting behind the margin. Posterior border quite short, convex in poriferous to a little emarginate in poreless somites. In lateral aspect upper margin is faintly concave anteriorly and a little convex posteriorly in poriferous somites, straight or even faintly concave in poreless somites. Dorsal furrow curving a little upward anteriorly, not reaching waist but running cephalad to about four-fifths length of metasomite. Dorsal furrow caudally curving abruptly dorsad and briefly paralleling posterior margin of somite. Ventral impression demarcating the paranota visible up to about two-fifths of length of metasomite in both poriferous and poreless somites. Dorso-ventral width of paranota rather narrow, the poreless only a little narrower than the poriferous. Paranota not callous. Pores of moderate size, situated at anterior end of an

oval excavation. Posterior edges of paranota in lateral aspect more or less acuminate.

Sternites and legs: Sternites of middle somites longer than wide (ratio: 1.6:1.0). Cross-impressions strongly developed, with deep longitudinal and transverse impressions. At bases of coxae rather large rounded conical protuberances projecting downward and a little caudad, distinct particularly at anterior pair of coxae and especially in 9th, 10th and 11th somites, becoming less distinct in posterior somites. Pubescence of sternites dense, with setae of moderate length. Sternite of 4th somite rather widely and moderately deeply excavate, moderately setiferous, with long setae. Sternite of 5th somite with a low hump between anterior legs, which is produced into a large shovel-like process a little in front of coxal bases. This process is directed cephalad at base, crooked halfway so as to become directed more ventrad distally. Process projecting distinctly in front of sternite. Posterior surface in lateral aspect convex at base, more distally concave; anterior surface convex in profile, apically provided with a dense brush of short setae. Process a little broader than distance between anterior coxae, distally quite broadly rounded, subangular in the middle. Posterior surface rather weakly pubescent with long setae. Transverse impression distinct and deep. Posterior part of sternite raised as a transverse, rounded wall, without longitudinal impression, densely set with long setae. Sternite of 6th somite not raised above ventral level of metasomal ring, deeply excavate. Coxal bases scarcely raised. Pubescence moderate, with long hairs. Transverse impression weak. Sternite of 7th somite with a large gonopod aperture pressing the ambulatory legs a little laterad. Latero-cephalad of aperture a rather low callous wall. Sternite of 8th somite anteriorly widely concave and only slightly raised above ventral level of metasomal ring. Anterior coxal bases not raised, distinctly more separated than posterior. Transverse impression weak. Pubescence dense, with long setae. Legs of moderate length, rather stout. Prefemur dorsally moderately convex, femora faintly arched. Pubescence dense on ventral side of all podomeres and on all sides of the tarsi and the anterior tibiae, remaining surfaces without apparent pubescence. Hairs rather long. Scopulae present on tibiae and tarsi of all legs up to 6th somite, absent on all postgonopodal legs. Relative length of podomeres 2 to 6 in middle somites: 0.60, 1.00, 0.65, 0.55, 0.75. First leg strongly incrassate, with the usual ventral femoral tubercle. Coxae of 2nd legs ventro-apically thickly rounded, but not projecting.

Anal somite: Upper profile faintly convex, almost straight. Surface somewhat wrinkled. Epiproct of moderate length and thickness, slightly concave on ventral side, broad at base with sides concavely converging, more distally straight and convex towards apex. Near apex a slight stepwise narrowing. Apex truncate and a little emarginate, lateral edges narrowly rounded. Setae not on tubercles. Valves with rather

narrow and moderately high rims. Setae on minute tubercles. Hypoproct large and triangular, parabolically rounded with sides widely and apex more narrowly rounded. Setae on small tubercles which do not project outside margin.

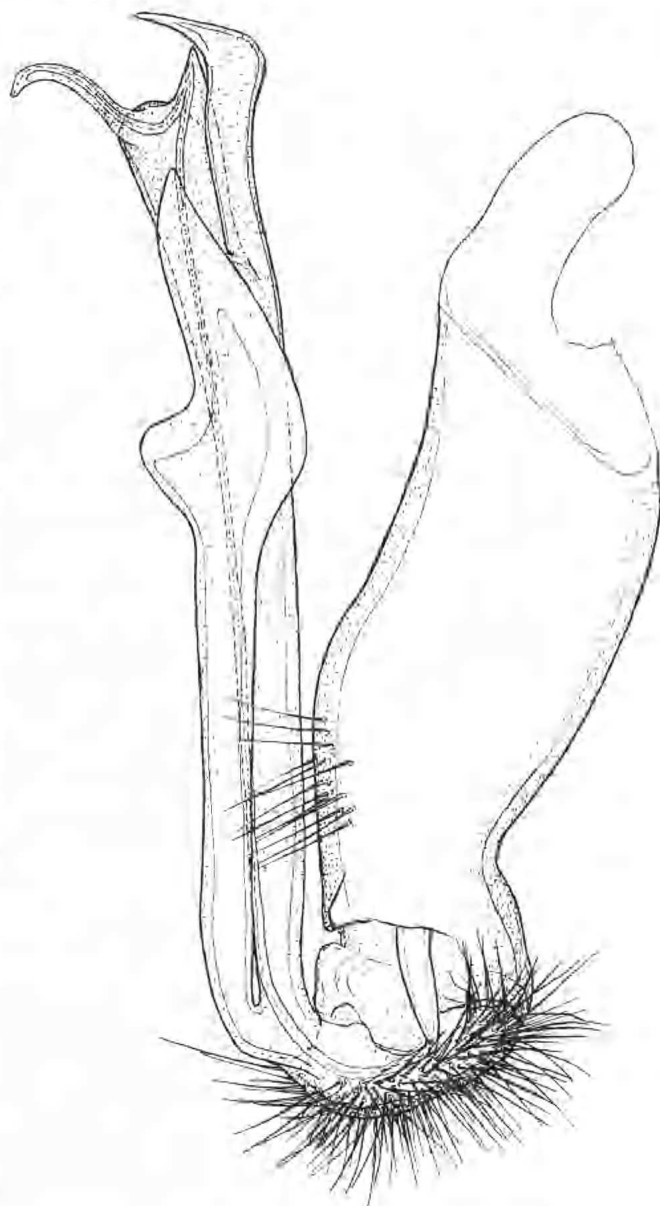


FIG. 3. *Somethus grossi* n. sp., holotype ♂, right gonopod, medial aspect.

Gonopods: (Fig. 3) Coxa long and stout, tapering a little towards apex and curving a little caudad. At medio-anterior side of apex a small conical process. Prefemur rather short, rounded, its longitudinal axis transverse to axis of acropodite. Demarcation from acropodite transverse. Acropodite split into two main branches: a caudal tibiotarsus, and a combined solenomerite and femoral process. Tibiotarsus long, narrow at its base but widening halfway to a laminate apical part. Combined solenomerite and femoral process split at about three quarters of length into a solenomerite proper and separate femoral process. Latter tapers apically and curves caudad. Spermial channel runs along anterior side of acropodite, and finally along medial side of

solenomerite proper, making a loop in a triangular preapical process. Apex of solenomerite narrow, pointing caudad.

Female: Differing from the male, aside from the usual sexual characters, in having vertex of head transversely widely and evenly convex. Vertigial sulcus quite deeply impressed. Antennae shorter, with the antennomeres more obconical. Relative length of antennomeres 2 to 6: 1.00, 0.95, 0.95, 0.95, 0.90. Third somite with a low transverse pleural keel along posterior margin. Sternites flattened, impressions distinctly less deep than in the male, longitudinal ones very wide. Cones absent. Ratio of length/width: 1.1:1.0. Pubescence rather dense, hairs shorter than in male. Legs with straight femora. Relative length of podomeres 2 to 6 in middle somites: 0.80, 1.00, 0.55, 0.55, 0.70. Coxa of 2nd pair of legs distally produced into a large caudal transverse, callous process, giving coxa from behind a broad triangular aspect, as broad at base as long medially, and basally produced laterad of prefemoral basis. Epigynal structure consisting of two paramedian rather narrow emarginations embracing coxal bases of 2nd pair of legs, and medially separated by a triangular prominence.

Remarks

The new species is easily distinguished from the type-species, *S. fuscipes*, by the gonopods having a long, distally widening tibiotarsus (Chamberlin (1920) describes the "basal spur" as a "thin lanceolate blade narrowed at each end, a little twisted . . ."). the absence of pleural keels in the male, the presence of sternal cones in the male, and the larger size (in *S. fuscipes* 2.8 mm).

The species is named after its collector, apparently one of the very few people in South Australia who took the trouble to collect millipedes, including most of the material treated in this paper.

Oncocladosoma n. gen.

Generic diagnosis

Rather robust to small Australiosomatini with 20 somites and a normal pore formula. Head with vertex transversely flattened in male, normally convex in female. Antennae of moderate length, slightly to distinctly clavate, basal antennomeres subcylindrical, distal ones more obconical in shape.

Somites rather weakly to moderately constricted, waist rather narrow, distinctly longitudinally ribbed or beaded. Metatergites smooth, hairless. Transverse furrow present from 5th somite onwards, rather weakly to rather deeply impressed. Pleural keels vestigial or absent in male, moderately developed up to 4th somite in female.

Paranota rather weakly developed.

Sternites distinctly longer than wide in male, about as long as wide or a little longer than wide in female. Sternal cones weakly developed to vestigial. Sternite of 5th somite of male with a process between anterior legs.

Legs rather long; first leg of male incrassate and with a ventral femoral tubercle. Tibial and tarsal scopulae present only in a number of legs in the anterior half of the body of male.

Gonopods with prefemur ovoid, its longitudinal axis almost transverse on the axis of the acropodite. Acropodite deeply split into two main branches, femoral part almost vestigial. Tibiotarsus undivided, more or less clubshaped, with a rather narrow "stem" and a widened, more or less complicated distal half. Seminiferous branch exceeding tibiotarsus in length, end typically uncate and recurved. Spermial channel running along posterior side of seminiferous branch, turning distally towards medial side, and running to extreme distal part of the seminiferous branch before abruptly recurving towards apex. Just proximad of distal edge of seminiferous branch and cephalad of course of spermial channel there is a vestige of the femoral process, which is completely absent, however, in the type-species. A little more proximad on medio-caudal side of seminiferous branch there is in the type-species a short spinelike process, vestigial or absent in the other species.

Type-species: Australiosoma castaneum Attems, 1944.

Remarks

This genus is characterized mainly by the peculiar shape of the acropodite of the gonopods, with its single clubshaped tibiotarsus, its typically uncate seminiferous branch, the absence or almost complete reduction of the femoral process, and the course of the spermial channel, which makes a slight loop before running towards the apex of the solenomerite.

In having the gonopod telopodite deeply split into two main branches, *Oncocladosoma* bears some similarity to the genera *Dicladosoma* Brolemann, 1913, *Dicladosomella* Jeekel, 1982, *Phyllocladosoma* Jeekel, 1968, and *Somethus* Chamberlin, 1920. *Dicladosoma*, from Mt. Kosciusko, is distinct in having the base of the tibiotarsus twisted towards the latero-anterior side of the seminiferous branch. It moreover seems distinct in having apparently no loop in the course of the spermial channel. *Dicladosomella*, *Phyllocladosoma* and *Somethus* have a more erect telopodite, and the spermial channel makes a loop in a distinctly developed process. *Dicladosomella*, from southeastern New South Wales, has a more laminate tibiotarsus, and the apex of the solenomerite is typically directed distad. *Phyllocladosoma*, from northeastern New South Wales and southeastern Queensland, resembles *Dicladosomella* in most of the characters mentioned, but it is distinguished by the abbreviate solenomerite, the apex of which extends scarcely beyond the loop-bearing process. *Somethus* is distinguished by having a distinctly developed femoral process. Both, *Dicladosomella* and *Phyllocladosoma*, lack any indication of a femoral process.

The new genus contains, besides its type-species, which is divided into two subspecies, two new species.

Geographically it seems to be confined to the Mt. Lofty Ranges.

Oncocladosoma castaneum (Attems)

Australiosoma castaneum Attems, 1944: 249; Jeekel, 1968: 26.

This species is represented by two subspecies, *O. c. castaneum* and *O. c. ingens* n. subsp., characterized by a significant difference in size.

Material

O. c. castaneum (Attems):

Mt. Lofty, 21.IX.1883, leg. Tepper, 1 ♂, 1 ♀.

Belair, 15.V.1938, leg. R. V. Southcott, 2 ♂.

Belair, Mt. Lofty Ranges, leg. N. B. Tindale, 1 ♂.

O. c. ingens n. subsp.:

Near Mt. Lofty Station, 1V.1883, Dr. Haacke don., ♂ holotype, 23 ♂, 11 ♀, 6 juv ♂ (19 somites), 2 juv ♀ (19 somites) paratypes.

Bridgewater, 2.II.1884, leg. Tepper, 1 ♂ paratype.

Norton Summit, Mt. Lofty Ranges, 7.IV.1884, leg. Tepper, 2 ♂ paratypes.

Mt. Lofty, Waterfall Gully, 23.VI.1884, leg. Tepper, 1 ♂ paratype.

Onkaparinga River, near Mylor, 11.V.1947, leg. G. F. Gross, 2 ♂ paratypes.

Mylor, 20.IV.1957, leg. G. F. Gross, 1 ♂ paratype.

Upper Sturt, Soil Tx 104, 5.V.1962, leg. R. V. Southcott, 1 ♂ paratype.

Bridgewater, Lot no. 11-72a, IX.1972, leg. G. H. Baker, 1 ♂, 3 ♀ paratypes.

Without locality or other data, 9 ♂, 5 ♀, 1 juv ♀ (19 somites) paratypes.

Without locality or other data, 2 ♂, 2 ♀ paratypes.

Description

Colour: Head brown, vertex and lateral sclerites blackish. Area around the antennal sockets and margins of lateral sclerites pale brownish. Antennae brown, 6th antennomere and basal part of 7th infusate; tip whitish; the intersegmental membranes pale brownish. Collum blackish, margin behind vertex reddish brown; a rather narrow zone along posterior margin, broadest medially and tapering towards sides, brownish yellow. Prosomites and anterior part of metasomites blackish brown, posterior part of metatergites, i.e. medially from just in front of transverse furrow caudad, yellowish brown. Posterior part of paranota and posterior zone of sides also yellowish brown. Demarcation between the darker and lighter colours not sharp. Venter, sternites and legs brownish, three distal podomeres infusate, intersegmental membranes and tip of tarsi yellowish brown. Anal somite dorsally, including epiproct, yellowish, sides blackish. Paraprocts black, margined with yellowish brown. Hypoproct yellowish brown. More heavily infuscated specimens have pale colour only along posterior margin of metasomites. Specimens which have

been stored in alcohol for a long time are brown in general, with the lighter colour only vaguely indicated. Juveniles dirty whitish, without colour pattern.

Width: *O. c. castaneum*; ♂: 2.8-3.2 mm, ♀: 3.0 mm. *O. c. ingens*; ♂: 3.5-4.3 mm, ♀: 3.4-4.0 mm, juv ♂ (19 s.): 2.9-3.2 mm, juv ♀ (19 s.): 2.7-2.9 mm.

Head and antennae: Labrum moderately widely and moderately deeply emarginate. Clypeus strongly impressed towards labrum, surface uneven due to presence of setiferous pits; on each side below antennal sockets wide impression. Lateral border of clypeus faintly convex, with a notch near labrum. Pubescence moderate becoming sparse in frontal region and on lateral sclerites; above labrum a series of hairs, hairs rather short. Frons not demarcated from vertex or clypeus. Antennal sockets separated by 1.4 times diameter of a socket or by 0.7 times length of 2nd antennomere. Vertex shiny, hairless, transversely faintly convex, a little more so near lateral edges, longitudinally almost evenly and rather widely convex. Postantennal groove rather deep and rather wide; wall moderately prominent. Beanshaped area at posterior side of antennal sockets well demarcated and inflated. Vertical sulcus well impressed, not reaching upper level of antennal sockets, with short fine transverse wrinkles. Antennae of moderate length, moderately stout, slightly clavate. Antennomeres subcylindrical, but 5th more obconical, and 6th still more obconical but not inflated. Pubescence moderate in proximal antennomeres, becoming dense in distal ones. Relative length of 2nd to 6th antennomeres: 0.95, 1.00, 0.95, 0.85, 0.70.

Collum: Subtrapezoidal in dorsal outline, a little wider than head. Anterior border straight in middle, widely rounded more laterally and straight again towards lateral sides. Posterior border widely and weakly concave in middle, straight laterally. Lateral sides asymmetrically and rather widely rounded, with strongest convexity caudal. Surface hairless, shiny and almost polished, with weak irregular wrinkles. Surface transversely widely convex, more strongly so towards lateral sides and laterally even slightly incurved; longitudinally weakly convex, slightly more so towards anterior and posterior margins. Marginal rim laterally moderately wide, not particularly raised; premarginal furrow distinct, disappearing at lateral edge of vertex.

Somites: Constriction rather weak. Waist rather narrow, sharply demarcated from pro- and metasomites, distinctly longitudinally ribbed down to upper level of paranota, finely striate below that level. Prosomites dull, with a fine cellular structure and fine short striae. Metatergites smooth, hairless, shiny, with some irregular weak wrinkles. Transverse furrow finely and not deeply impressed, without apparent sculpturing, present from 5th to 17th somite, vaguely indicated on 18th. Furrow running laterad to about a distance from upper demarcation of paranota of about one and a half times

or a little more the dorsoventral width of a poriferous paranotum. Sides smooth or slightly wrinkled, granulate up to 4th somite. Pleural keels abortive or absent.

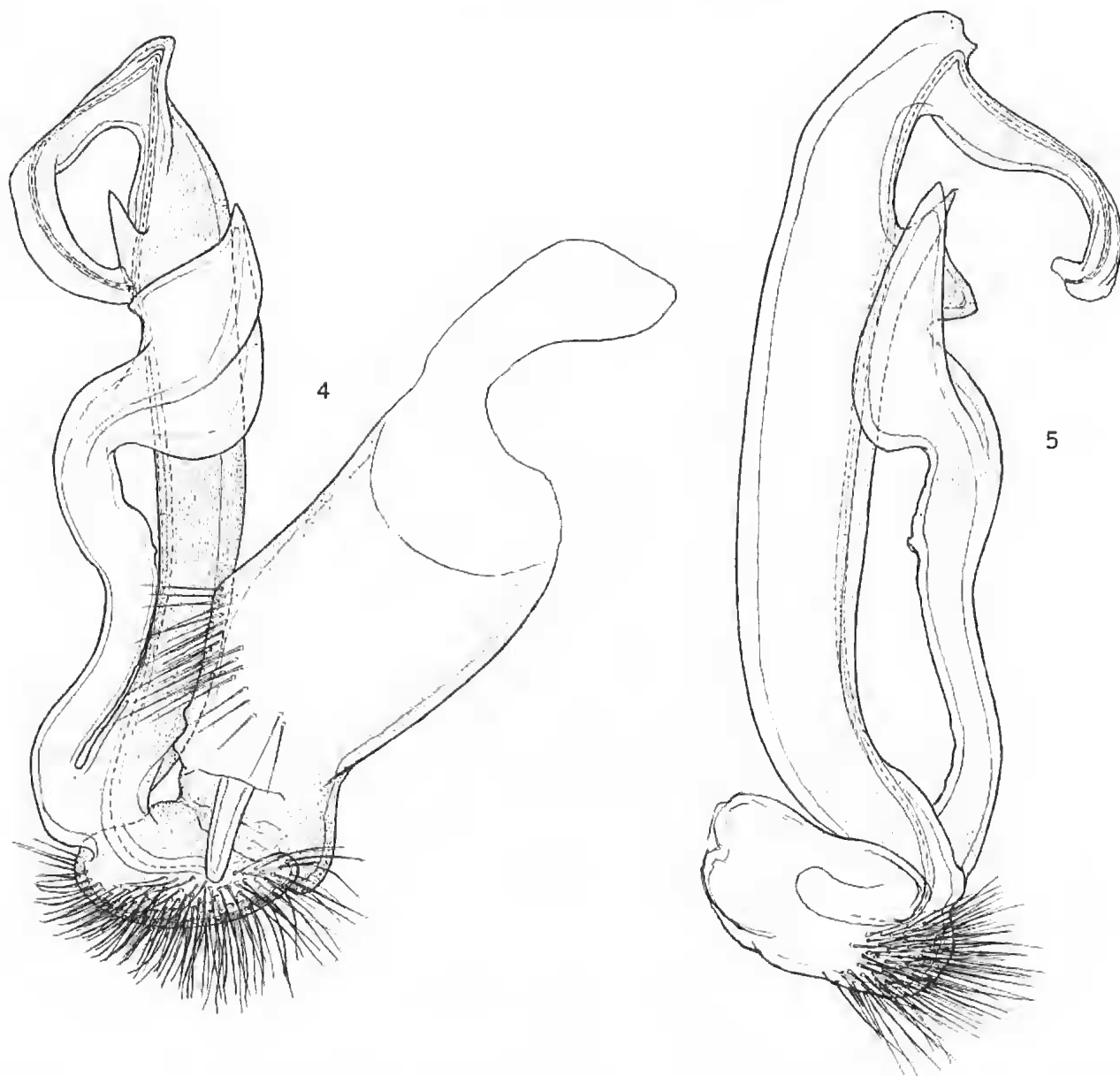
Paranota: 2nd somite a little wider than collum; 3rd somite a little wider than 2nd and about as wide as 4th. Paranota of 2nd somite with anterior margin a little thrust forward, widely convex. Latero-anterior edge subangular, narrowly rounded, without distinct tooth. Lateral margin widely and almost evenly rounded, but behind middle a little more strongly convex and caudally straight, hardly diverging. Latero-posterior edge subangular, slightly produced and projecting slightly behind posterior margin of somite. Posterior margin short, widely convex. Paranota situated on a low level, rather weakly prominent, although margin visible from above. Upper margin in lateral aspect widely and weakly convex, sloping a little cephalad. Marginal callus rather wide from the middle onwards, narrower anteriorly, its lower side straight. Premarginal furrow distinct on all sides, briefly parallelling the posterior margin of the somite. Paranota of 3rd somite with anterior margin not shouldered at base, widely convex, merging via a stronger rounding into the widely convex lateral margin. Posterior edge subangular, slightly produced caudad. Posterior margin short, a little concave. In lateral aspect marginal callus moderately wide; ventral demarcation by a depression is present only in posterior half, converging dorsad somewhat convexly and meeting dorsal demarcation in an acute angle. Paranota of 4th somite similar to those of 3rd, but lateral margin a little more widely rounded, and posterior edge caudally not produced. Paranota of 5th and subsequent somites rather weakly prominent. Lateral margin in dorsal aspect weakly to faintly convex, anteriorly slightly more rounded; poriferous paranota caudally slightly more convex than the poreless. Latero-posterior edge subangular, quite narrowly rounded, faintly produced caudad in most somites, more so in the somites of posterior half of the body, but projecting behind the caudal margin of the somite only in the 18th. In lateral aspect upper demarcation of the callus convex (poriferous somites) or straight (poreless somites), premarginal furrow turning upward near waist but not reaching it. Ventral demarcation by a depression present only in the caudal half or three-fifths of the paranota, converging straight (poreless) or convexly (poriferous somites) towards the dorsal demarcation in an acute angle, more acute in poreless than in poriferous somites. Dorsoventral width of paranota moderate, in poreless somites about two-thirds of poriferous. Posterior margin finely rimmed, the premarginal furrow briefly parallelling caudal margin of metatergite. Pores situated quite near the ventral edge of the marginal callus, in a rather small oval pit.

Sternites and legs: Sternites of middle somites longer than wide (ratio 1.6:1.0). Cross impressions well developed, rather wide. Sternal cones present on all

postgonopodial sternites up to 17th somite, rather small near anterior coxae, and still more weakly developed near posterior coxae. Pubescence rather dense to dense, located in four quadrants of each sternite. Median and transverse impressions hairless; hairs of moderate length. Sternite of 4th somite rather broad, with a well-developed median impression, no sternal cones. Pubescence rather dense. Sternite of 5th somite with a subtrapezoidal process arising between and a little in front of anterior coxal sockets; process broader than long, a little wider than width between coxae, directed downward and cephalad, bending abruptly downward in distal half, projecting distinctly in front of anterior margin of sternite. Anterior surface of process in profile convex halfway, apex with a dense brush of short setae. Posterior surface widely concave, moderately densely set with rather long setae. Apex of process in caudal aspect broadly rounded, medially faintly angulate, lateral edges narrowly rounded. Behind process a deep transverse impression. No longitudinal impression between posterior coxae, but posterior coxal sockets connected by a transverse wall which is densely set with long setae. Sternite of 6th somite scarcely (anteriorly) or not (posteriorly) raised above ventral level of metasomal ring. Coxal sockets scarcely raised and coxae not elongate. Pubescence consisting of two transverse zones of densely set long hairs. Sternite of 7th somite lateroanteriorly with a finely rugulose-granulose transverse wall. Gonopod aperture large, separating coxal sockets of posterior legs. Sternite of 8th somite anteriorly not raised above ventral level of metasomal ring; anterior coxae somewhat separated. Transverse impression weakly developed. Posterior part not modified, cones abortive. Pubescence moderate, hairs rather long. Legs in general rather long and stout, prefemora dorsally convex, femora faintly arched. Pubescence ventrally dense on all podomeres, hairs rather long. Dorsal pubescence not obvious, except on tibiae and tarsi and partly also on postfemora. Scopulae of tibiae and tarsi present up to anterior legs of 8th somite, totally absent from posterior legs of that somite onwards. Relative length of podomeres 2 to 6: 0.80, 1.00, 0.65, 0.60, 0.80. Legs of first pair strongly incrassate, with a ventral femoral process. Coxae of 2nd pair medially rather thickly rounded but only weakly produced distad.

Anal somite: Upper profile about straight or faintly convex. Epiproct broad, moderately thick, rather short, ventrally somewhat concave. Sides concavely converging, narrowing abruptly just before apex, which is truncate, caudally weakly emarginate, lateral edges narrowly rounded. Setae not on tubercles. Paraprocts with narrow and rather low rims; setae not on tubercles or latter abortive. Hypoproct parabolically rounded, setae on abortive tubercles.

Gonopods: (Figs 4-5) Characterized mainly by the shape of the tibiotarsus. Moreover there is no trace of



FIGS. 4-5. *Oncucladosoma custanetum ingens* n. subsp., holotype ♂. 4: right gonopod, medial aspect. 5: telopodite of left gonopod, anterior aspect.

a femoral process. On the other hand the species has a spinelike process arising from the medio-caudal side of the seminiferous branch a little proximad of the base of the distal hook. The morphological status of this process is not yet clarified.

Female: Head with the antennal sockets separated by 1.4 times diameter of a socket or by 0.8 times length of 2nd antennomere. Vertigial sulcus slightly less impressed, vertex transversely widely and evenly convex. Relative length of antennomeres 2 to 6: 1.00, 0.95, 0.90, 0.85, 0.80. Somite 2 with pleural keels represented by a strongly developed rounded ridge. A thick dorsally sharply demarcated rounded swelling in 3rd somite, in 4th an abortive swelling. Sternites about as wide as long. The cross-impressions much weaker, without sternal cones. Setation rather dense, but setae rather short. Legs with ventral pubescence rather dense, hairs of moderate length. Relative length of podomeres 2 to 6: 0.70, 1.00,

0.50, 0.45, 0.80. Coxa of 2nd pair of legs with a caudo-lateral callous process, pointed and directed caudo-laterad, medially not produced. Epigynal structure consisting only of two emarginations of ventral side of 3rd somite, embracing coxae of 2nd pair of legs, and medially separated by a low triangular process pointing cephalad. Lateral border of emarginations raised.

Remarks

When we compare the present drawings of the gonopods with the one which Attems (1944) published, there can be but little doubt that the presently recorded material belongs to the same species. It will be noted, however, that there are important discrepancies between the drawings. In the first place Attems misidentified the small process at the medio-caudal side of the seminiferous branch as a side branch of the tibiotarsus (the latter erroneously called "Femoralfortsatz").

Furthermore, he illustrated a separate femoral process (erroneously indicated as "Tibiotarsus"), emanating distinctly proximad of the distal edge of the seminiferous branch. Such a process is not observed in the present material, and we must assume that Attems either misinterpreted the chitinous structures in his preparation or that the gonopod he examined was damaged.

The subspecies *ingens* appears to differ from the nominate subspecies mainly in its larger size. Differences in the details of the gonopods must be substantiated by future research when more material becomes available. Whereas the subspecies *castaneum* appears to be confined to Belair (unfortunately Attems gave only "Sudaustriem" as type locality), the subspecies *ingens* occurs in a much larger area of the Mt. Lofty Ranges.

Oncocladosoma conigerum n. sp.

Material

Without locality label, but found in a tube together with *O. castaneum ingens*: ♂ holotype, 4 ♂ paratypes.

Near Mt. Lofty Station, IV.1883, Dr Haacke don., 1 ♀ paratype.

Without locality label, 6 ♂ paratypes, 2 ♀ paratypes.

Description

Colour: Essentially the same as that of the preceding species, but less infusate (possibly due to prolonged preservation in alcohol). Dark colour of head confined to vertex and frontal region; lateral sclerites of the head pale brownish. Antennae brown, joints paler. Collum and somites as in *castaneum* but pale and dark colours less contrasting. Distal podomeres scarcely infusate.

Width: ♂ : 2.1-2.4 mm; ♀ : 2.3-2.6 mm.

Head and antennae: Lateral border of clypeus with notch indistinct. Antennal sockets separated by 1.3 times diameter of a socket or by 0.55 times length of 2nd antennomere. Postantennal bean-shaped area a little inflated, moderately demarcated. Antennae rather stout. Relative length of antennomeres 2 to 6: 1.00, 0.95, 0.80, 0.80, 0.75.

Collum: A little narrower than head. Lateral sides almost evenly rounded.

Somites: Waist distinctly beaded dorsally. Transverse furrow disappearing laterally at a distance from dorsal demarcation of paranota equal to dorso-ventral diameter of a poriferous paranotum. Pleural keels weakly developed up to 3rd somite, faintly indicated in 4th.

Paranota: 3rd somite about as wide as 2nd; 4th a little wider than 3rd. Paranota of 2nd somite with marginal callus of equal width. Paranota of 3rd somite without anterior edge, latero-anterior border rather strongly rounded. In lateral aspect upper demarcation of paranota of 3rd and 4th somites slightly concave, turning upward anteriorly and posteriorly; the upper demarcation not sloping caudad. Paranota of 5th and subsequent somites with posterior edge narrowly

rounded, scarcely produced except very slightly so in posterior somites but not projecting behind posterior margin of somites. In lateral aspect ventral demarcation of paranota more strongly convex, meeting upper demarcation in a wider angle than in *castaneum*, giving posterior edge of paranota a more subtruncate appearance.

Sternites and legs: Sternites of middle somites longer than wide (ratio 1.65: 1.00). Process of sternite of 5th somite with process about as long as wide at base, about parabolic in posterior aspect. Posterior half of sternite with a median rather deep furrow; pubescence rather dense, setae longish. Sternite of 6th somite with a distinct transverse furrow, but without longitudinal impression. Sternite of 7th somite with a weak callus latero-cephalad of gonopod aperture. Legs with scopulae up to first pair of 8th somite as in preceding species. Pubescence on ventral side of legs long. Relative length of podomeres 2 to 6 in middle part of body: 0.65, 1.00, 0.60, 0.55, 0.80.

Anal somite: Upper profile faintly convex, weakly convex in front of base of epiproct. Epiproct longish, broad. Caudal emargination very weak. Hypoproct rather large, about evenly semicircularly rounded.

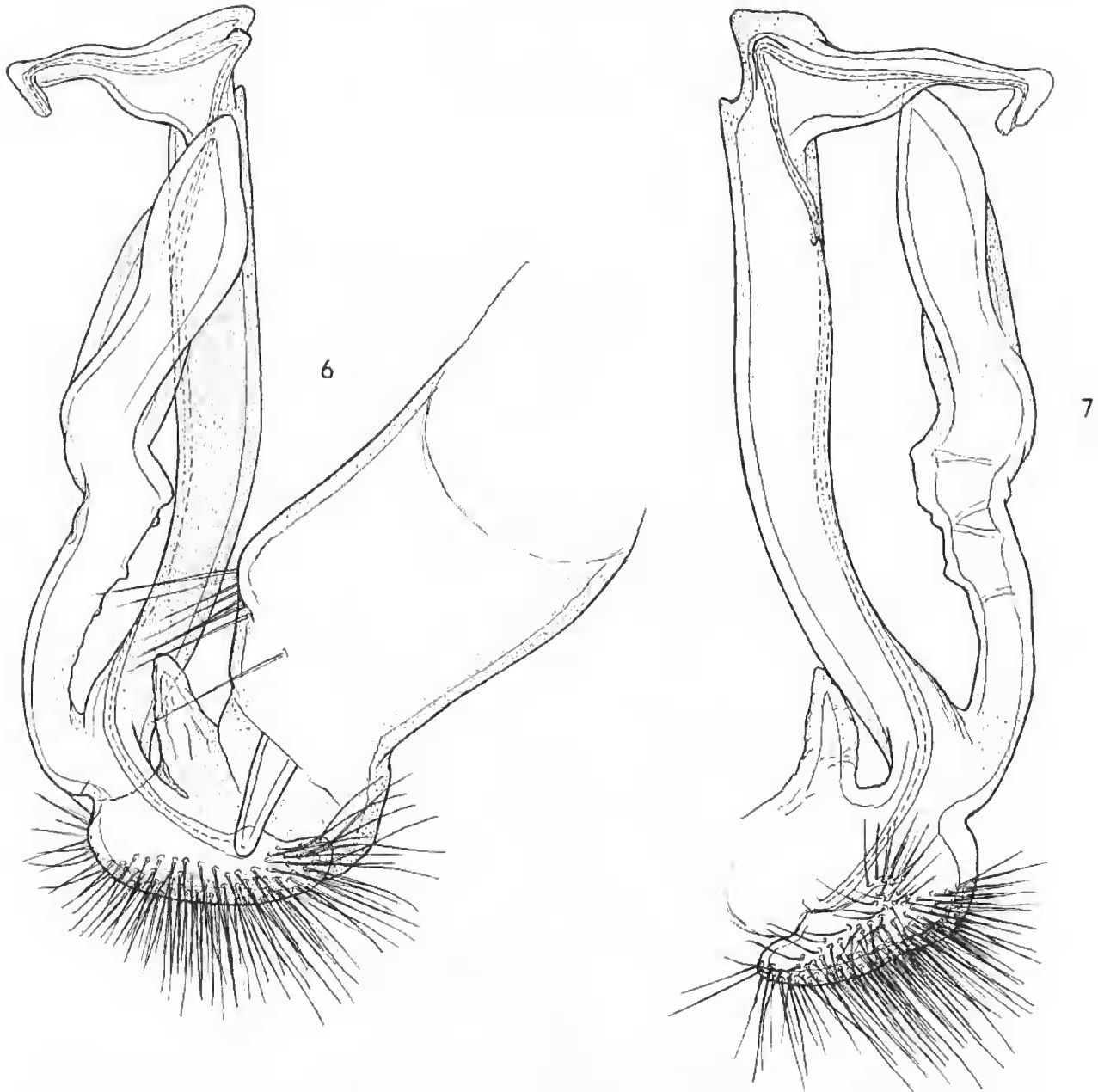
Gonopods: (Figs. 6-7) Coxa relatively a little more robust than in *O. castaneum*. Prefemur with a weakly chitinized conical process emanating from intersegmental membrane connecting coxa and prefemur. Acropodite largely similar to that of *O. castaneum*, differing mainly in shape of tibiotarsus. Seminiferous branch with a slight vestige of a femoral process. The larger spinelike process of *O. castaneum* is represented here by a tiny tooth.

Female: Head with clypeus moderately impressed towards labrum. Antennal sockets separated by 1.3 times diameter of a socket or by 0.7 times length of 2nd antennomere. Antennae relatively shorter; relative length of antennomeres 2 to 6: 1.00, 0.90, 0.85, 0.90, 0.75. Collum more evenly rounded transversely. Somites with pleural keels on 3rd somite represented by a low cone near caudal margin. On 4th somite a faint ridge. Sternites of middle somites 1.2 times longer than wide. Legs less incrassate, femora straight. Relative length of podomeres 2 to 6 in middle part of body: 0.70, 1.00, 0.55, 0.50, 0.70. Epigynal structure with paramedian emarginations deeper than in *castaneum*, surface of the ventral side of 3rd somite anteriorly raised, and median conical process directed more downward.

Remarks

In the characters not mentioned above, the description of *O. castaneum* applies.

This species looks like a diminutive form of *O. castaneum*, being even smaller than the subadult specimens of that species. It differs only in small proportional details of its external morphology, but it is well characterized by the structure of the gonopods.



FIGS. 6-7. *Oncocladosoma conigerum* n. sp., holotype♂. 6: right gonopod, medial aspect. 7: left gonopod, anterior aspect.

Although most of the material was lacking a locality label, the fact that part of it was found in a tube containing *O. castaneum ingens* seems to imply that it occurs sympatrically with that species in the Mt. Lofty Ranges.

Oncocladosoma clavigerum n. sp.

Material

Belair, VI.1883, leg. J. W. Haacke, ♂ holotype, 15 ♂, 8 ♀, 2 juv. ♂ (19 somites), 1 juv. ♀ (19 somites) paratypes.

Blackwood, VI.1883, leg. J. W. Haacke, 2 ♂, 1 ♀ paratypes.

Woodley's Vineyard (near Glen Osmond, SE Adelaide), soil, Berlese funnel, 30.VII-8.VIII.1950, leg. R. V. Southcott, 2 ♂ paratypes.

Sellick's Hill, 23.IX.1954 (E.S.I. 1592), leg. G. F. Gross, 1 ♂.

Description

Colour: Similar to that of the two preceding species, but less pronounced possibly due to preservation. Dark colour of head confined to vertex and frontal regions; lateral sclerites of head pale brownish. Antennae dark brown, distal annuli of antennomeres and intersegmental membranes pale brownish. Collum brown, without distinctly paler marginal areas. Somites brown, darkest in waist area, without paler bands; only posterior halves of paranota a somewhat paler brown, and posterior halves of metatergites also slightly paler. Anal somite also with a paler epiproct, and margins vaguely paler. Hypoproct pale brown. Sternites and legs pale brown; three distal podomeres somewhat infuscate, but no pale annuli. Tip of tarsi pale.

Width: ♂ : 1.5-1.8 mm, ♀ : 2.0-2.3 mm, juv. ♂ (19 somites) 1.4 mm, juv. ♀ (19 somites) 1.4 mm. The

material from Belair seems slightly smaller (δ : 1.5-1.8 mm, φ : 2.0-2.2 mm) than the specimens from elsewhere, which measure 1.8 mm and 2.3 mm for the two sexes respectively.

Head and antennae: Labrum rather widely emarginate. Clypeus rather strongly impressed towards labrum. Antennal sockets separated by 1.6 times diameter of a socket or by 0.85 times length of 2nd antennomere. Antennae rather stout, distinctly clavate (involving 5th and especially 6th antennomere), 6th antennomere a little inflated. Relative length of antennomeres 2 to 6: 1.00, 1.00, 0.95, 0.95, 0.90.

Collum: Distinctly narrower than head, subreniform to subtrapezoidal in dorsal outline. Anterior border almost evenly rounded, only slightly more convex behind edges of vertex. Posterior border laterally widely convex. Lateral sides rather narrowly and almost evenly rounded. Surface of collum longitudinally evenly and widely convex.

Somites: Constriction moderate. Waist dorsally distinctly beaded, laterally distinctly to finely striate. Prosomites dull, with rather pronounced fine cellular structure. Transverse furrow of metatergites sharply and rather deeply impressed, with fine longitudinal striation, disappearing laterally at about a distance from dorsal demarcation of paranota equal to dorso-ventral diameter of a poreless paranotum. Transverse furrow indicated on 4th, and very vaguely also on 18th somite. Pleural keels on 3rd somite weakly indicated by a furrow; abortive on 4th somite.

Paranota: 2nd somite scarcely wider than collum. Paranota of 2nd somite with latero-anterior edge narrowly rounded, without tooth. Lateral margin only faintly convex, a little more so towards posterior edge, scarcely visible from above. In lateral aspect margin almost straight, moderately thick and of equal width. Paranota of 3rd somite latero-anteriorly evenly and rather widely convex. Posterior edge angular, slightly produced caudad but not projecting behind margin of the somite. Paranota of 4th somite with posterior edge faintly produced. In lateral aspect dorsal demarcation of paranota of 3rd and 4th somites faintly concave, turning upward gradually at anterior end. Paranota of 5th and subsequent somites with ventral demarcation rather convexly converging with upper demarcation, giving paranota, particularly the poriferous ones, an obliquely truncate aspect in lateral view. Caudal edges not projecting behind margin of somites. Pores in a relatively large and deep pit, nearer ventral margin, rather near posterior edge.

Sternites and legs: Sternites of middle somites longer than wide (ratio 1.6: 1.0). Sternal cones not obvious, quite weakly developed. Pubescence moderately dense, all over sternite, the setae of moderate length. Sternite of 5th somite with the process between the anterior legs subtriangular, the apex rather widely

rounded, about as long as wide. Anterior side in profile weakly convex, the process almost perpendicular, scarcely projecting in front of sternite. Caudal half of sternite widely transversely concave, rather densely set with longish setae. Sternite of 6th somite with coxal sockets conspicuously more widely separated. Sternite of 7th somite with pregonopodial wall weakly prominent. Sternite of 8th somite with anterior coxae widely separated. Sternite anteriorly flattened, a little raised. Transverse impression and posterior half of sternite not modified. Pubescence moderate, with setae longish. Legs of moderate length or longish, rather stout. Relative length of podomeres 2 to 6 in middle somites: 0.75, 1.00, 0.65, 0.70, 0.85. Coxae of 2nd pair not medially produced. Coxae of first pair of legs of 6th somite and of anterior pair of 8th somite slightly produced into a weak rounded conc. Ventral pubescence of legs rather dense.

Anal somite: Upper profile straight, slightly convex anteriorly. Apex of epiproct relatively narrowly truncate, scarcely emarginate. Hypoproct subtrapezoidal, with median part of apex somewhat triangularly produced; setae on faint tubercles which are faintly produced.

Gonopods: (Figs 8-9) Coxa relatively slightly more slender than in the other two species. Tibiotarsus typically club-shaped, with a relatively long stem. Seminiferous branch characterized by the rather strong curvature; femoral process reduced to a tiny lobe. The more proximal spine, present in *O. castaneum* and vestigial in *O. conigerum*, is totally absent here.

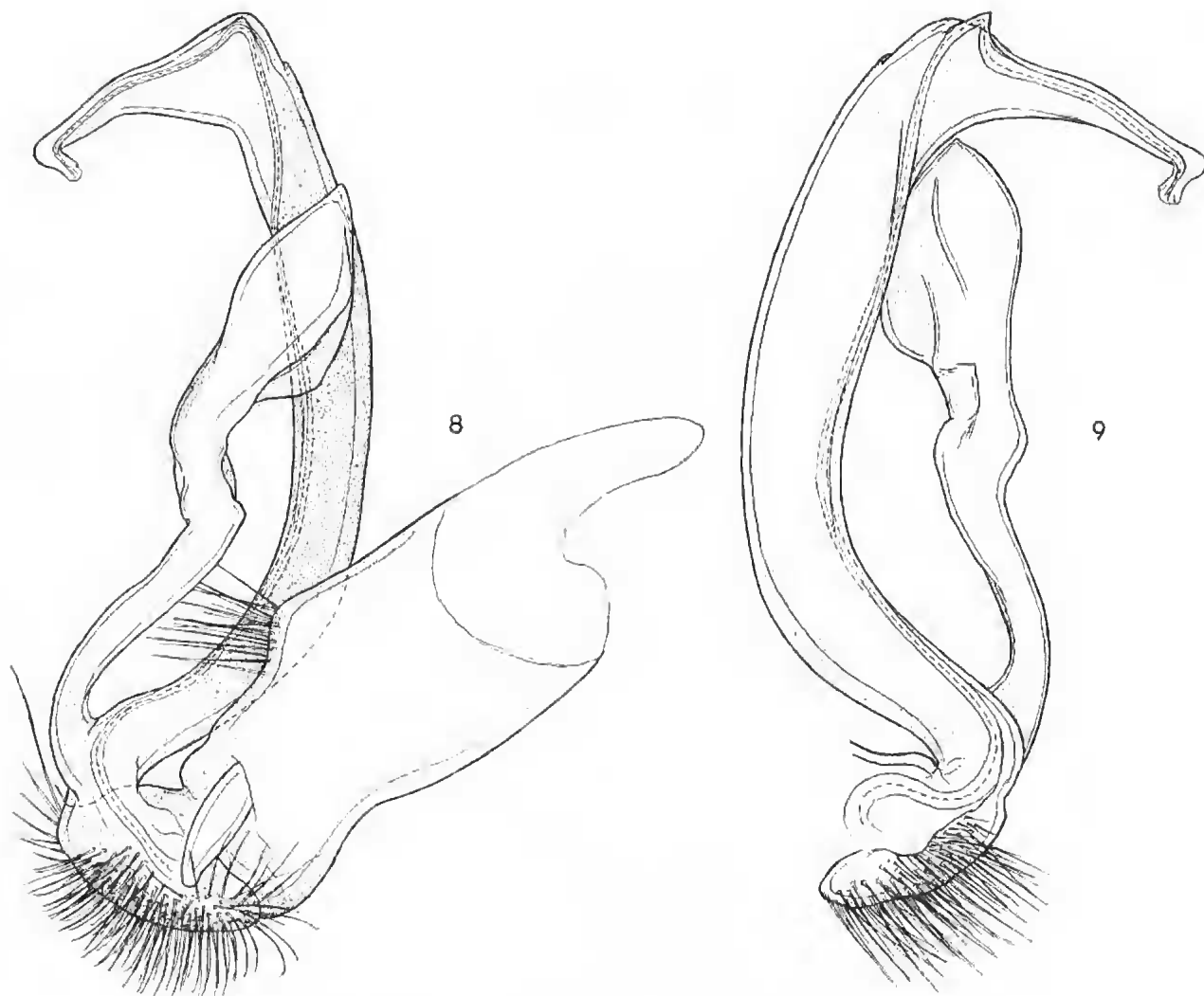
Female: Head with antennal sockets separated by 1.5 times diameter of a socket or by 0.9 times length of 2nd antennomere. Relative length of antennomeres 2 to 6: 1.00, 0.90, 0.85, 0.90, 0.85. Pleural keels of 2nd somite well developed, those of 3rd somite represented by a low conical swelling near posterior margin; in 4th somite this swelling is very weak and small. Keels are dorsally not demarcated by a furrow. Sternites of middle somites 1.1 times longer than wide. Setae of moderate length. Relative length of podomeres 2 to 6 in middle part of body: 0.80, 1.00, 0.55, 0.45, 0.95. Coxae of 2nd pair of legs on caudal side with a low rounded transverse callus. Epigynal structure with median point directed obliquely downward; lateral anterior projection also directed obliquely downward.

Remarks

In points not mentioned the description of *O. castaneum* applies.

This is the smallest representative of the genus *Oncocladosoma*, differing from the other species in small details of the external morphology and particularly in the structure of the gonopods.

It may be of interest to note that the specimens from Belair are slightly smaller on the average, parallelling the conditions in *O. castaneum*. In the present case, however, the differences seem insignificant.



FIGS. 8-9. *Oncocladosoma clavigerum* n. sp., holotype ♂. 8: right gonopod, medial aspect. 9: left gonopod, anterior aspect.

**THE STATUS OF *POLYDESMUS*
(*STRONGYLOSOMA*) *INNOTATUS* KARSCH, 1881**

The taxonomic position of this species, allegedly based on a female specimen from Adelaide, has been uncertain since the publication of its description. Through the kindness of Dr M. Moritz of the Museum für Naturkunde der Humboldt-Universität in Berlin, I was able to re-examine the type-specimen, hoping that it could be associated with one of the paradoxosomatids received from the South Australian Museum.

The type-specimen is in bad condition; its antennae and most of its legs are missing. Moreover, it is not an adult female, but a juvenile with 19 somites. Nevertheless, on account of its external characters it has become clear that the species is different from other Paradoxosomatidae reported from South Australia. In case the species is rediscovered in South Australia its most salient characters are mentioned here.

"Strongylosoma" innotatum (Karsch)

Polydesmus (Strongylosoma) innotatus Karsch, 1881: 42.
Strongylosoma innotatum; Attems, 1898: 307.

Material

Adelaide, Schomburgk leg., 1 juv. ♀ (19 somites), ZMB Kat.Nr. 560, holotype.

Descriptive notes

Colour: Dull brownish, apparently faded.

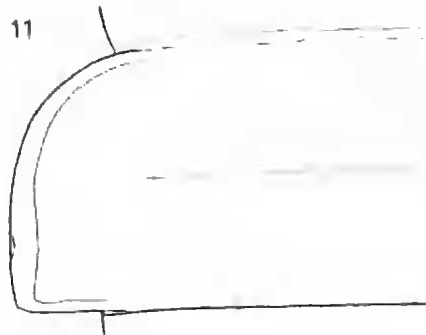
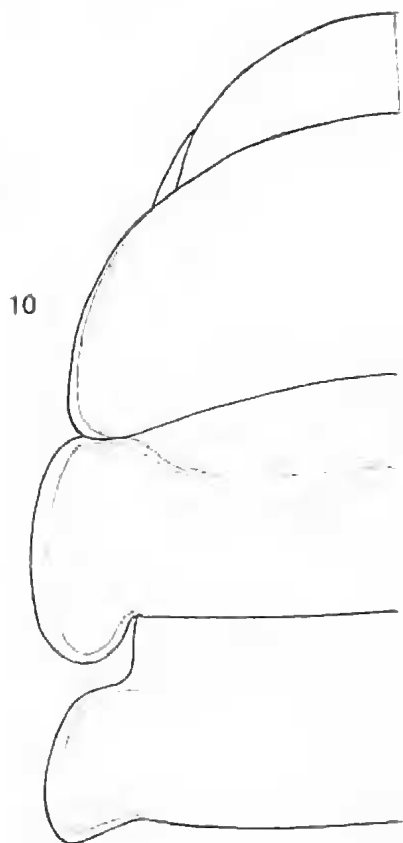
Width: 3.5 mm.

Head and antennae: Without particulars.

Collum: Wider than head (Fig. 10). Lateral sides flaring, rather widely rounded and without posterior edge; lateral border merging gradually into caudal border.

Somites: Waist rather narrow, without apparent sculpture. Metatergites of 4th to penultimate somite with a generally deeply impressed transverse furrow, running far laterad and reaching in most cases dorsal premarginal furrow of paranota.

Paranota: (Figs 10-11) 2nd somite distinctly wider than collum; 3rd and 4th each slightly narrower than preceding somite. Paranota of 2nd somite on a low level, well developed; anterior border shouldered at base and



FIGS. 10-11. "*Strongylosoma*" *innotatum* (Karsch), holotype ♀ juvenile (19 somites). 10: left side of head, collum and 2nd and 3rd somites, dorsal aspect. 11: left side of 9th somite, dorsal aspect.

thrust forward a little, widely rounded, merging into rather faintly convex lateral margin via a somewhat stronger rounding. Posterior edge rather narrowly rounded but not angular. Posterior border a little convex; posterior part of paranota projecting distinctly caudad of margin of somite. Paranota of 3rd and 4th somites also prominent, widely rounded anteriorly and laterally, more narrowly rounded caudally and projecting a little behind margin of somites. Paranota of 5th and subsequent somites at first subangular caudally, but in second half of body becoming more distinctly angular, though produced caudally and projecting only a little from 15th somite onwards.

Sternites and legs: Sternites without distinctive characters; legs mostly absent (in specimen).

Anal somite: Epiproct moderately developed, apex truncate with a weak caudal emargination. Hypoproct rather broadly triangular, with sides and apex rounded.

Remarks

Since the specimen is a juvenile, most of its external characters may be less pronounced than in the adult, in particular the adult male. The paranota are different from those of any of the other South Australian paradoxosomatid genera. In particular the relatively wide expansion of the paranota of the 2nd somite seems characteristic. In this respect the species appears to have a certain similarity with *Otoplacosoma bivittatum* Verhoeff, 1924, from the Kimberley district of Western Australia, which would mean that eventually it may prove to belong to the tribe Antichiropodini. It should be borne in mind though, that it is also possible that the locality label is wrong, in which case the systematic position of the species probably will be an enigma for ever.

SUMMARY OF SOUTH AUSTRALIAN PARADOXOSOMATIDAE

With the completion of the study of the Paradoxosomatidae of the collection of the South Australian Museum, it may be useful to summarize the results which have been obtained so far.

The number of known species has increased from two to ten and one subspecies. The list is as follows:

Tribe Antichiropodini

Antichiropus mairnillifer Jeekel

Aulacoporus pruvoti (Brolemann)

Tridactylogonus obscurus Jeekel

Incertae sedis

"*Strongylosoma*" *innotatum* (Karsch)

Tribe Australiosomatini

Heterocladosoma zebratum n. sp.

Heterocladosoma galaxias n. sp.

Somethus grossi n. sp.

Oncocladosoma c. castaneum (Attems)

Oncocladosoma c. ingens n. subsp.

Oncocladosoma conigerum n. sp.

Oncocladosoma clavigerum n. sp.

Considering the fact that the southeastern part of South Australia, where these paradoxosomatids were obtained, is quite remote from the nearest occurrence of the family elsewhere and is moreover drier than the areas in eastern Australia where the majority of the other described species occur, it is remarkable that the number of endemic genera is so relatively low. To this category belong only *Tridactylogonus* and *Oncocladosoma*. The other genera, viz. *Antichiropus*, *Aulacoporus*, *Heterocladosoma* and *Somethus*, are

shared with other Australian states, where, according to our present knowledge they all show a greater diversity. *Antichiropus* has quite a number of species occurring along the west coast of Western Australia. *Heterocladosoma* has three distinct species in the coastal area of Queensland from Cairns to Brisbane, and, according to as yet unpublished data, *Somethus* has two species in Tasmania and one in eastern Victoria. *Aulacoporus* has a number of species in Queensland and the northern part of New South Wales, but the South Australian record of *A. pruvoti* probably represents an introduced population. It is evident anyway that the fauna of South Australia, as far as the non-endemic genera are concerned, is composed of a mixture of western (*Antichiropus*), northeastern (*Heterocladosoma*), and southeastern (*Somethus*) elements (Fig. 12). Considering the diversity within each of these genera

elsewhere it seems probable that South Australia became populated along these routes, rather than the reverse.

The relationship of the two endemic genera has not yet been satisfactorily determined. *Tridactylogonus* seems to belong to a group of small antichiropodine paradoxosomatids which focuses in Victoria, Tasmania and southern New South Wales. *Oncocladosoma* appears to be closely related to *Somethus*, *Dicladosomella* and *Phyllocladosoma*, indicating a faunistic connection between South Australia, Tasmania, eastern New South Wales and southern Queensland.

Oncocladosoma represents, moreover, a particularly interesting case. The genus has been found only in the Mt. Lofty Ranges, where it is represented by four partly sympatric taxa. No other paradoxosomatids have been reported from this probably best-explored part of South Australia, and the faunal composition shows the aspects

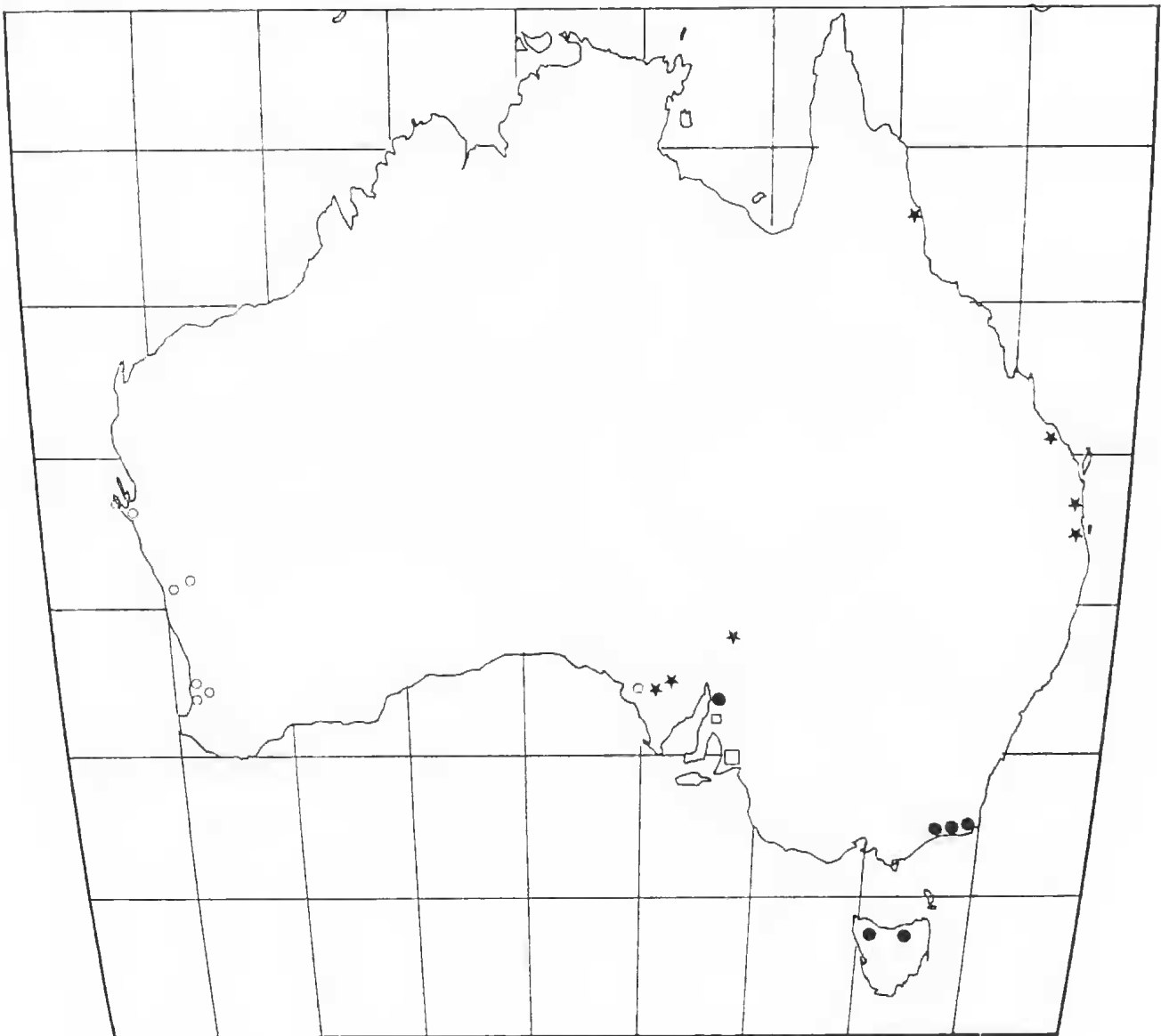


FIG. 12. Map showing the distribution of the non-endemic South Australian australiosomatine genera *Heterocladosoma* (*), *Somethus* (●), and *Antichiropus* (○), and the endemic genera *Oncocladosoma* (□) and *Tridactylogonus* (△).

of that of a long isolated island. During an early period this area must have been populated by a single species, possibly from the *Somethus*-stem, which, in the course of a long period of isolation, radiated in a number of closely related taxa.

The present picture of the distribution of the South Australian Paradoxosomatidae, incomplete as it undoubtedly is, seems to indicate that the fauna is the result of exchanges during at least two widely separated periods in history. The first of these periods, which may be more or less arbitrarily dated at the late Mesozoic or early Tertiary, saw a faunal connection between Victoria and southern New South Wales and South Australia, and is witnessed by *Tridactylogonus* and *Oncocladosoma*. The second, possibly occurring during the late Tertiary, brought representatives of *Heterocladosoma*, *Somethus* and *Antichiropus* to South Australia.

Of course, this is a very simplified explanation of what actually may have happened, but it will be interesting to assemble further data to verify and work out the details of the hypothesis.

RECORDS OF SOME MEDITERRANEAN JULIDAE INTRODUCED INTO SOUTH AUSTRALIA

Records of millipedes introduced into Australia from elsewhere are few. Baker (1978) extensively reported on the distribution and dispersal of the west Mediterranean julid *Ommatoiulus moreleti* (Lucas) in South Australia and Victoria. I have summarized the known records of European millipedes in Tasmania (Jeekel 1981) and more recently added the oriental paradoxosomatid *Orthomorpha coarctata* (De Saussure) to the Australian list (Jeekel 1982a).

The material of the South Australian Museum contained, besides some specimens of *Ommatoiulus*, also a number of samples of a Mediterranean species of *Brachyiulus* not previously known to occur in Australia.

Brachyiulus lusitanus Verhoeff

Brachyiulus pusillus lusitanus Verhoeff, 1898: 153, Pl. 6, Fig. 28.

Microbrachyiulus calcivagus Verhoeff, 1910: 225, Pl. 2, Figs. 33-34.

Brachyiulus lusitanus; Jawlowski, 1930: 183, Fig. 4; Strasser, 1976: 606, Fig. 37.

Material

Woodley's Vineyard (near Glen Osmond, SE Adelaide), soil, Berlese funnel, 30.VII-8.VIII.1950, leg. R. V. Southcott, 3♂, 5♀, 8 juvs.

Woodley's Vineyard, soil, Berlese funnel, 3.IX.1950, leg. R. V. Southcott, 4 juvs.

Sellick's Hill, 23.IX.1954 (E.S.I. 1953), leg. G. F. Gross, 1♀.

Burnside, 12.VI.1962, leg. Mr Waxman, 2♂, 3♀.

Burnside, 24.I.1963, leg. Mr Waxman, 1♂, 16♀.

Remarks

This species was originally described from Portugal, and has since been recorded from numerous localities in the Mediterranean region, eastward to Greece, Turkey, Syria and Turkestan. Apparently most of the records outside the western Mediterranean range concern synanthropic localities, and the species is obviously easily distributed by commerce. Outside the palaearctic region records are still few, and since Jawlowski (1930) reported *B. lusitanus* from Mexico the species was only recently mentioned as occurring in the southeastern United States by Filka & Shelley (1980) where it seems to have been previously misidentified as *Brachyiulus pusillus* (Leach).

B. lusitanus is similar to *B. pusillus*, but differs in its slightly larger maximum size; it can be easily separated by the fanlike phylacum of the posterior gonopods (spiniform in *B. pusillus*) (see the illustrations in Verhoeff (1910), Jawlowski (1930) and Strasser (1976)).

Ommatoiulus moreleti (Lucas)

Iulus moreleti Lucas, 1860: 96.

Archiiulus moreleti; Attems, 1928: 291, Pl. 18, Figs. 427-432.

Schizophyllum moreleti; Schubart, 1966: 23, Figs. 12-20.

Ommatoiulus moreletii; Baker, 1978: 1.

Material

North End Pt. Lincoln, 13.XI.1955, leg. M. Carrick, 2♀.

Remarks

This species originates from the Iberian Peninsula, where it apparently occupies a rather restricted range in the northern half of Portugal and adjacent Spain. It has been reported from a number of Atlantic islands (Canary Islands, Madeira, the Azores, Bermuda, St. Helena), the Cameroons and South Africa. In Australia it is known to become more and more wide-spread in South Australia and Victoria (Baker 1978) and it has also been reported from Tasmania, although as yet it does not seem to be so well established there.

Once it is introduced into a suitable environment it spreads rapidly and becomes a dominant element of the millipede fauna of the area. On Teneriffe (Canary Islands) for instance, it is seen almost anywhere in areas under human influence. Schubart (1966) gave an extended report on its distributional aspects in South Africa, where it appears to have spread over a large part of the country in the course of a few decades. Baker has described a similar phenomenon in South Australia.

Ommatoiulus and *Brachyiulus* are easily distinguished from the autochthonous juliform millipedes of South Australia by the longitudinal striation of the dorsal side

of the metasomites and by the freely projecting cauda, the latter being particularly distinct in *Ommatoiulus*. *Brachyiulus* is further distinguished by having two yellowish dorsal paramedian bands.

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